

## CLAIMS

1. An information record medium onto which a whole stream including a plurality of partial streams each comprising a series of content information is multi-recorded by a unit of a packet that is a physically accessible unit, said medium comprising:
  - an object data file for storing object data comprising a plurality of packets each storing a piece of the content information and being multiplexed by the unit of the packet; and
  - an object information file for storing association definition information to define a relationship between multiplexed packets and the plurality of partial streams, as reproduction control information to control a reproduction of said object data file, wherein
  - the plurality of partial streams include a plurality of video streams comprising a plurality of angle video informations corresponding to a plurality of viewpoints,
  - each of the plurality of angle video informations comprises an assembly of minimum image units, which are individually reproducible and defined by a predetermined standard,
  - each of the minimum image units is divided and stored into the packets in said object data file, and
  - in the object data file, a switch unit as a logical section for an angle switching on a reproduction time scale is defined such that the plurality of packets for dividing and storing a same minimum image unit does not extend over a boundary of the switch unit, and

such that a minimum image unit reproducible without using another minimum image unit belonging to an anterior switch unit extending over the boundary of the switch unit is arranged as a first minimum image unit of the switch unit.

5

2. The information record medium according to claim 1, wherein the minimum image unit is a GOP (Group of Picture) based on a MPEG (Moving Picture Experts Group) standard.

10 3. The information record medium according to claim 1, wherein the switch unit is defined by position information, the position information indicating a head address of the switch unit.

4. The information record medium according to claim 3, wherein  
15 the position information is stored for each switch unit, in a switch unit address table constructed in said object information file.

5. The information record medium according to claim 3, wherein the position information is stored for each switch unit, in a  
20 navigation packet forming a part of the partial streams in said object data file.

6. The information record medium according to claim 5, wherein the position information as for anterior  $n$  ( $n$  is natural number  
25 equal to or more than 1) switch units and posterior  $m$  ( $m$  is natural number equal to or more than 1) switch units, with respect to a

switch unit to which the navigation packet is belonged as a standard, is stored in the navigation packet.

7. The information record medium according to claim 5, wherein  
5 the navigation packet is arranged as a head packet of the switch unit.

8. The information record medium according to claim 3, wherein  
the position information is a serial number of the packets or a PTS  
10 (Presentation Time Stamp).

9. The information record medium according to claim 1, wherein  
the association definition information has table information, the  
table information indicating, for each partial stream, packet  
15 identification numbers assigned specifically to a plurality of packets multiplexed at a same time.

10. The information record medium according to claim 1, further  
comprising a reproduction sequence file for storing reproduction  
20 sequence information to define a reproduction sequence of the object data.

11. An information record apparatus for multi-recording a whole  
stream including a plurality of partial streams each comprising a  
25 series of content information by a unit of a packet that is a physically accessible unit, onto an information record medium, said

apparatus comprising:

a first record device for recording an object data file, the object data file storing object data comprising a plurality of packets each storing a piece of the content information and being  
5 multiplexed by the unit of the packet; and

a second record device for recording an object information file, the object information file storing association definition information to define a relationship between multiplexed packets and the plurality of partial streams, as reproduction control information to  
10 control a reproduction of said object data file, wherein

the plurality of partial streams include a plurality of video streams comprising a plurality of angle video informations corresponding to a plurality of viewpoints,

each of the plurality of angle video informations comprises an  
15 assembly of minimum image units, which are individually reproducible and defined by a predetermined standard,

each of the minimum image units is divided and stored into the packets in said object data file, and

in the object data file, a switch unit as a logical section for an  
20 angle switching on a reproduction time scale is defined such that the plurality of packets for dividing and storing a same minimum image unit does not extend over a boundary of the switch unit, and such that a minimum image unit reproducible without using another minimum image unit belonging to an anterior switch unit  
25 extending over the boundary of the switch unit is arranged as a first minimum image unit of the switch unit.

12. An information record method of multi-recording a whole stream including a plurality of partial streams each comprising a series of content information by a unit of a packet that is a physically accessible unit, onto an information record medium, said  
5 method comprising:

a first record process of recording an object data file, the object data file storing object data comprising a plurality of packets each storing a piece of the content information being multiplexed by  
10 the unit of the packet; and

a second record process of recording an object information file, the object information file storing association definition information to define a relationship between multiplexed packets and the plurality of partial streams, as reproduction control information to  
15 control a reproduction of said object data file, wherein

the plurality of partial streams include a plurality of video streams comprising a plurality of angle video informations corresponding to a plurality of viewpoints,

each of the plurality of angle video informations comprises an assembly of minimum image units, which are individually  
20 reproducible and defined by a predetermined standard,

each of the minimum image units is divided and stored into the packets in said object data file, and

in the object data file, a switch unit as a logical section for an angle switching on a reproduction time scale is defined such that  
25 the plurality of packets for dividing and storing a same minimum

image unit does not extend over a boundary of the switch unit, and such that a minimum image unit reproducible without using another minimum image unit belonging to an anterior switch unit extending over the boundary of the switch unit is arranged as a first  
5 minimum image unit of the switch unit.

13. An information reproduction apparatus for reproducing the information record medium according to claim 1, said apparatus comprising:

10 a reproduction device for reproducing said object data file and said object information file;

an input device for inputting externally an instruction for an angle switching; and

a control device for controlling the reproduction device to  
15 reproduce a video stream relating to one angle video information in said object data file, on the basis of the association definition information included in said object information file reproduced by said reproduction device, and to switch from a reproduction of a video stream relating to said one angle video information to a  
20 reproduction of a video stream relating to another angle video information, at a boundary of the switch unit, in accordance with the instruction for the angle switching inputted via said input device.

25 14. An information reproduction method of reproducing the information record medium according to claim 1 and implemented

by an information reproduction apparatus having (i) a reproduction device for reproducing said object data file and said object information file and (ii) an input device for inputting externally an instruction for an angle switching, said method comprising:

5           a first control process of controlling the reproduction device to reproduce a video stream relating to one angle video information in said object data file, on the basis of the association definition information included in said object information file reproduced by said reproduction device, and

10           a second control process of controlling the reproduction device to switch from a reproduction of a video stream relating to said one angle video information to a reproduction of a video stream relating to another angle video information, at a boundary of the switch unit, in accordance with the instruction for the angle  
15 switching inputted via said input device.

15. An information record reproduction apparatus for multi-recording and reproducing a whole stream including a plurality of partial streams each comprising a series of content  
20 information by a unit of a packet that is a physically accessible unit, onto an information record medium, said apparatus comprising:

          a first record device for recording an object data file, the object data file storing object data comprising a plurality of packets each storing a piece of the content information and being  
25 multiplexed by the unit of the packet; and

          a second record device for recording an object information file,

the object information file storing association definition information to define a relationship between multiplexed packets and the plurality of partial streams, as reproduction control information to control a reproduction of said object data file, wherein

5           the plurality of partial streams include a plurality of video streams comprising a plurality of angle video informations corresponding to a plurality of viewpoints,

          each of the plurality of angle video informations comprises an assembly of minimum image units, which are individually  
10   reproducible and defined by a predetermined standard,

          each of the minimum image units is divided and stored into the packets in said object data file, and

          in the object data file, a switch unit as a logical section for an angle switching on a reproduction time scale is defined such that  
15   the plurality of packets for dividing and storing a same minimum image unit does not extend over a boundary of the switch unit, and such that a minimum image unit reproducible without using another minimum image unit belonging to an anterior switch unit extending over the boundary of the switch unit is arranged as a first  
20   minimum image unit of the switch unit,

          said apparatus further comprising:

          a reproduction device for reproducing said object data file and said object information file;

          an input device for inputting externally an instruction for an  
25   angle switching; and

          a control device for controlling the reproduction device to



reproduce a video stream relating to one angle video information in said object data file, on the basis of the association definition information included in said object information file reproduced by said reproduction device, and to switch from a reproduction of a video stream relating to said one angle video information to a reproduction of a video stream relating to another angle video information, at a boundary of the switch unit, in accordance with the instruction for the angle switching inputted via said input device.

10

16. An information record reproduction method of multi-recording and reproducing a whole stream including a plurality of partial streams each comprising a series of content information by a unit of a packet that is a physically accessible unit, onto an information record medium and implemented by an information record reproduction apparatus having (i) a reproduction device for reproducing an object data file and an object information file and (ii) an input device for inputting externally an instruction for an angle switching, said method comprising:

20 a first record process of recording the object data file, the object data file storing object data comprising a plurality of packets each storing a piece of the content information and being multiplexed by the unit of the packet; and

a second record process of recording an object information file, the object information file storing association definition information to define a relationship between multiplexed packets and the

25

plurality of partial streams, as reproduction control information to control a reproduction of said object data file, wherein

the plurality of partial streams includes a plurality of video streams comprising a plurality of angle video informations  
5 corresponding to a plurality of viewpoints,

each of the plurality of angle video informations comprises an assembly of minimum image units, which are individually reproducible and defined by a predetermined standard,

each of the minimum image units is divided and stored into  
10 the packets in said object data file, and

in the object data file, a switch unit as a logical section for an angle switching on a reproduction time scale is defined such that the plurality of packets for dividing and storing a same minimum image unit does not extend over a boundary of the switch unit, and  
15 such that a minimum image unit reproducible without using another minimum image unit belonging to an anterior switch unit extending over the boundary of the switch unit is arranged as a first minimum image unit of the switch unit,

said method further comprising:

20 a first control process of controlling the reproduction device to reproduce a video stream relating to one angle video information in said object data file, on the basis of the association definition information included in said object information file reproduced by said reproduction device, and

25 a second control process of controlling the reproduction device to switch from a reproduction of a video stream relating to

said one angle video information to a reproduction of a video stream relating to another angle video information, at a boundary of the switch unit, in accordance with the instruction for the angle switching inputted via said input device.

5

17. A computer program for a record control to control a computer disposed at the information record apparatus according to claim 11, said program making the computer function as at least a part of the first record device and the second record device.

10

18. A computer program for a reproduction control to control a computer disposed at the information reproduction apparatus according to claim 13, said program making the computer function as at least a part of the reproduction device, the input device and the control device.

15

19. A computer program for a record reproduction control to control a computer disposed at the information record reproduction apparatus according to claim 15, said program making the computer function as at least a part of the first record device, the second record device, the reproduction device, the input device and the control device.

20

20. A data structure including a control signal, wherein a whole stream including a plurality of partial streams each comprising a series of content information is multi-recorded by a unit of a packet

25

that is a physically accessible unit, said structure comprising:

an object data file for storing object data comprising a plurality of packets each storing a piece of the content information and being multiplexed by the unit of the packet; and

5 an object information file for storing association definition information to define a relationship between multiplexed packets and the plurality of partial streams, as reproduction control information to control a reproduction of said object data file, wherein

10 the plurality of partial streams include a plurality of video streams comprising a plurality of angle video informations corresponding to a plurality of viewpoints,

each of the plurality of angle video informations comprises an assembly of minimum image units, which are individually  
15 reproducible and defined byon the basis of a predetermined standard and reproducible independently,

each of the minimum image units is divided and stored into the packets in said object data file, and

in the object data file, a switch unit as a logical section for an  
20 angle switching on a reproduction time scale is defined so such that the plurality of packets for dividing and storing the divided minimum image unit pieces obtained by dividing a same minimum image unit does not extend over a boundary of the switch unit, and such that a minimum image unit reproducible without using  
25 another minimum image unit belonging to an anterior switch unit extending over the boundary of the switch unit is arranged as a first

minimum image unit of the switch unit.